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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,221	05/23/2000	Michael A. Rolenz	D-375	4189

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EXAMINER	
FAHMY, SHERIF R	
ART UNIT	PAPER NUMBER
2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/577,221	ROLENZ, MICHAEL A.	
	Examiner	Art Unit	
	Sherif R. Fahmy	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 May 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 May 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Specification

1. The disclosure is objected to because of the following informalities: On page 6, line 6, "integrated" should read "integrator". On page 6, line 8, "quantifier" should read "quantizer".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 9 recites the limitation "the pulse width modulated laser signal" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examining the claim on the merits, the Office assumes the limitation is meant to read, "the modulated binary laser signal", which is mentioned in claim 1.

5. Claim 10 recites the limitation "the modulated signal" in line 7. There is insufficient antecedent basis for this limitation in the claim. Claim 1 does not mention at all "the modulated signal". Claim 1 does mention "a modulated symbol signal" in line 7 and "a modulated binary laser signal" in line 4 and again "the modulated binary laser signal" in line 9. Even if "the modulated signal of claim 10 refers to one of these, the claim does not specifically point out which one. For the purpose of examining the claim on the merits, the Office assumes the

limitation is meant to read, "the modulated binary laser signal", which is mentioned specifically in claim 1.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauducel et al in view of Palmer.

Beauducel et al teaches

a system for communicating an analog input signal (abstract) as a modulated binary signal (abstract) over a communication medium (col. 3- lines 59-62) recovered as an output digital signal, the system (fig. 2) comprising

a sigma delta modulator ($\Delta\Sigma$ in fig. 2) for receiving the analog input signal and modulating the analog signal into a modulated symbol signal,

a transmitter (7) for converting the modulated symbol signal into the modulated binary signal (col. 3- lines 59-62), and for transmitting the modulated binary signal over the communication medium(col. 3- lines 59-62),

a receiver (8) for receiving and detecting the modulated binary signal for providing a received symbol signal, and

a digital filter (10) for filtering the symbol signal into the digital output signal.

Beauducel et al does not specify a modulated binary *laser* signal. However, Beauducel et al does suggest that one of many different types of transmitters is to be used including optical (col. 3- line 62). Further, Palmer et al. teaches a communication system wherein a sigma-delta modulator (26, and col. 3- lines 44-46) is used with a laser transmitter (34 and 36). Official notice is taken that lasers are notoriously used in optical transmitters, and are advantageous because they have a long coherence length and therefore may be used to transmit phase information, they are able to maintain spacial power-distribution for long distances allowing for long transmission distances over free-space or waveguides, and they enable one skilled in the art to pack a large number of wavelength channels close together (spectrally) in a transmission system, due to the narrow spectral bandwidth of lasers. At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use a laser to transmit a modulated binary laser signal, in order to realize any of the advantages cited above and widely known in the art.

8. Regarding claim 8, Beauducel et al teaches in the system the communication medium being fiber optic (claim 15 in Beauducel et al).

9. Regarding claims 9 and 10, the combined teaching of Beauducel et al and Palmer does not specifically prescribe that the modulated laser signal is an on off shift keying signal, or that it is a phase shift keying signal. However, Beauducel et al does teach a modulated optical signal. Official notice is taken that the two types of modulation recited in claims 9 and 10 respectively are well-known in the art of optical communication and their use is a matter of design choice and will not alter the basic features and functions of the invention taught by Beauducel et al in

combination with Palmer. At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use on off shift keying as a matter of design preference. Also, at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use phase shift keying as a matter of design preference.

10. Claims 2-4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauducel et al in view of Palmer as applied to claim 1 above and further in view of Potratz et al.

Regarding claim 2, the combined teaching of Beauducel et al and Palmer specifically includes a symbol to binary converter for converting the modulated symbol signal (oversampled analog signal, in abstract) from the sigma-delta modulator into a converted digital signal (lower resolution digital words, in abstract). Though a symbol to binary converter is not mentioned per se, one is inherently disclosed by disclosing the function performed above, as means are necessary to perform the function. Accordingly, Beauducel et al's teaching accounts for producing binary signals from the symbol signals produced the sigma-delta modulator. Either this function is incorporated into the sigma-delta modulator, in the transmitter (7) or otherwise, mention of particular means is omitted from Beauducel et al, since it would be inherent to the teaching of transmitting digital signals, to include said means.

The teaching of Beauducel et al and Palmer does not specify a pulse width modulator for modulating the laser signal by the converted digital signal into the modulated binary laser signal as a pulse width binary modulated laser signal communicated over the communication medium. However, Beauducel et al does suggest that the transmitter (7) include a modulator to modulate an optical signal (col. 3- lines 59-63), without specifying the type of modulation. Further, Potratz teaches a system for communicating an analog input signal as a binary optical signal (fig. 1),

wherein a sigma-delta modulator is employed with a pulse-width modulator that modulates an optical signal.

At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to further modify the teaching of Beauducel et al and Palmer to include a pulse-width modulator in the transmitter, as taught in Potratz. The signal of the modified teaching must be represented somehow on a laser carrier. The choice of pulse-width modulation is a design choice, and would have been altogether obvious to one having ordinary skill in the art. One having ordinary skill in the art would have been motivated to use pulse-width modulation, for instance, to represent the long words of binary bits that the system of Beauducel et al transmits (abstract) by using NRZ, which in effect is pulse width modulation (the longer the pulse, the greater the number of binary 1's in a word). This is known to utilize less bandwidth. However, this being a design choice, it depends entirely on the intended use of the system and the type of data to be transmitted.

11. Regarding claim 3, the means in the receive side recited correspond to reversing the signal processing steps applied in the transmit size. Though the combined teaching of Beaducel, Palmer and Potratz does not specifically disclose that the receiver comprises a pulse width detector receiving the pulse width modulated binary laser signal and for providing a detected binary signal, generally a pulse-width modulator is used in the art in combination with a pulse-width demodulator. Accordingly, it would have been obvious, if not inherent to the teaching, for one having ordinary skill in the art to include a pulse-width detector in the modified receiver of Beauducel et al, Palmer and Potratz (8) where a pulse-width modulator is present in the transmitter (7), in order to decode the pulse-width information. The combined teaching of

Beaducel, Palmer and Potratz does not specifically mention per se a binary to symbol converter for converting the detected binary signal into the received symbol signal. However, Beauducel et al does teach that the function is performed in the system; lower resolution words are converted to higher resolution words (abstract). Accordingly, means to perform the function are inherent to the disclosure. In this case, the digital filter performs the function.

12. Regarding claim 11, the claim recites the same limitations recited in claim 3 with the base claims of claim 3.

13. Regarding claim 4, quantization is inherent to any conversion from analog to digital signals. Accordingly, the pulse width detector is a pulse width quantizer detector, the detected binary signal is a detected quantized signal, the binary to symbol converter converts the detected quantized signal into the received symbol signal.

14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beauducel et al in view of Palmer as applied to claim 1 above and further in view of Scott et al. The combined teaching of Beauducel et al and Palmer does not include a timing recovery loop for generating a timing signal from the received symbol signal for clocking the digital filter. Scott teaches a transmission signal that utilizes a sigma-delta modulator, wherein in the receiving side, a timing recovery loop (707) for generating a timing signal from the received symbol signal is used for clocking different elements (fig. 7, col. 5- lines 7-12). Scott teaches that using this timing recovery loop minimizes effects of any timing jitter during transmission (col. 5- lines 7-12). At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use the timing recovery loop taught in Scott to drive the digital filter in the combined

teaching of Beauducel et al and Palmer in order to minimize the effects of timing jitter as taught in Scott resulting in lower error in receiving the data.

15. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauducel et al in view of Palmer as applied to claim 1 above and further view of applicant's admitted prior art (AAPA) (fig. 1A- 1B, pages 6-7).

The combined teaching of Beauducel et al and Palmer does not specify first or second order sigma-delta converters. However, AAPA shows both types of sigma-delta modulators as well known in the prior art and used in data transmission.

Regarding claim 6, it would have been obvious to one having ordinary skill in the art to use a first order sigma-delta modulator as known in the art at the time the present invention was made (as admitted by applicant) in the system of the combined teaching of Beauducel et al and Palmer, because a first order sigma-delta modulator is the simplest sigma-delta modulator and requires the least number of parts. Hence it offers one having ordinary skill in the art the advantage of lower cost and/or simpler assembly in the event that the level of error offered by a first order sigma-delta modulator is sufficient for the specific needs of the system (this being a matter of design choice).

16. Regarding claim 7, it would have been obvious to one having ordinary skill in the art to use a second order sigma-delta modulator as known in the art at the time the present invention was made (as admitted by applicant) in the system of the combined teaching of Beauducel et al and Palmer, because a second order sigma-delta modulator results in a smaller error at the output of the modulator (AAPA, page 7- lines 3-5). One having ordinary skill in the art would have been motivated to use a second order sigma delta modulator in the event where a smaller error

was needed to meet the demands of the system (the level of tolerance for error being entirely a matter of design choice and depends on the application and other considerations).

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gaboury is cited for disclosing advantages to a combination of a sigma-delta modulator with a pulse-width modulator. Schlag, Campell et al, Farinelli, and Tiemann are cited for disclosing usage of sigma-delta modulators in communication systems.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sherif R. Fahmy whose telephone number is 703-305-8088. The examiner can normally be reached on 8:30AM-6:00PM(Mo-Th) 8:30AM-5:00PM(2nd & 4th Fr).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703-305-4729. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3988 for regular communications and 703-305-3988 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4800.

SRF
February 21, 2003

JASON CHAN
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